- **Lecture 5 Pertussis `` whooping cough``**

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• Learning Objectives:

1- What is pertussis, what cause it?
2- How does the child acquire the disease?
3- How does the patient presented to you?
4-What are the complications that the pt. may develop?
5- How can you manage the patients with pertussis?
6- How can we prevent pertussis?

• ***Pertussis:*** Pertussis is acute respiratory tract infection caused by Gram negative, toxin producing coccobacilli, ***Bordetella pertussis,*** which is the sole cause of epidemic pertusis. ***Bordetella parapertussis*** is an occasional cause (<5%) of sporadic cases.

Epidemiology of pertussis

• Pertussis is an endemic disease, with superimpose epidemic cycles every 3-4 yr, it is extremely contagious airborne disease, attack rate approach 100% in susceptible individual.

• Neither natural disease nor vaccination provide complete or lifelong immunity, protection begins to wane 3-5 yr after vaccination .

• In non-vaccinated areas it affect 1-5 yr age, while it occur mostly in infants, adolescent, & adults in vaccinated areas.

Clinical manifestation of pertussis:

classically pertussis is a prolonged disease of three main stages:-

1-Catarrhal stage (1-2 weeks):- after incubation period of 3-12 days the pt have congestion, rhinorrhea, low grade fever, sneezing and lacrimation.

2-Paroxysmal stage (2-6 week) The pt have dry intermittent irritative cough that evolve into paroxysms ***`hall mark of pertussis`*** start as machine-gun burst of uninterrupted coughs with protruded tongue, bulging watering eyes, chin and chest held forward, the face become purple until the cough cease with a loud whoop (forceful inspiratory gasp),

• **post tussive emesis** is common in all ages. and exhaustion is universal.

• The spasms of cough are often worse at night and may culminate in vomiting. During a paroxysm, the child has red or blue face, and mucus flows from the nose and mouth. **The number and severity of paroxysms escalate over days to a week and remain at that plateau for days to weeks.** At the peak of the paroxysmal stage, patients have >1 episode hourly

Infants <3 m old do not display the classic stages ,the whoop may be absent , but apnea is common at this age.

3- *Convalescent stage (≥2 weeks):-*

As the paroxysmal stage fades into the convalescent stage (≥2 week), **the number, severity, and duration of episodes diminish.** the symptoms gradually decrease, but may persist for many months Paradoxically in infants the cough and whoop may be louder and more classic in this stage.

- Infants younger than 3 months of age do not display the classic stages.
- Adolescents and previously immunized children have foreshortening of all stages of pertussis.
- Classically, adolescents and adults describe a sudden feeling of strangulation followed by uninterrupted coughs, feeling of suffocation, bursting headache, diminished awareness, and then a gasping breath, usually without a **whoop.**
- Findings on physical examination generally are non-informative. Signs of lower respiratory tract disease is not expected unless complicating secondary bacterial pneumonia is present. Conjunctival hemorrhages and petechiae on the upper body are common.

COMPLICATION OF PERTUSSIS

1- Apnea or bradycardia or both may result from:

- **Apparent laryngospasm.**
- **Vagal stimulation just before a coughing episode.**
- **From obstruction during an episode.**
- **Or from hypoxemia following an episode**

2- Secondary bacterial infection such as otitis media and pneumonia , fever, tachypnea or respiratory distress between paroxysms and absolute neutrophilia are clues to pneumonia (causative agents are S. aureus or S. pneumoniae).

3–**Physical sequelae of forceful cough** related to increased intrathoracic and intra-abdominal pressure during coughing can result in conjunctival and scleral hemorrhages, petechiae on the upper body, epistaxis, hemorrhage in the CNS and retina, pneumothorax and subcutaneous emphysema, umbilical and inguinal hernias.

4- **Neurological complications**: Acute neurologic events during pertussis almost always are the result of hypoxemia or hemorrhage associated with coughing or apnea in young infants. Seizures usually are a result of hypoxemia or hyponatremia (excessive secretion of ADH). The only neuropathology documented in pertussis is parenchymal hemorrhage and ischemic necrosis

5- Others : Bronchiectasis and collapsed lobes has been reported rarely after pertussis.

Progressive pulmonary hypertension in very young infants and secondary bacterial pneumonia are severe complications of pertussis and are the usual causes of death

- **Differential diagnosis**: Protracted coughing (which in some cases is paroxysmal) can be caused by Mycoplasma, para-influenza viruses, influenza viruses, enteroviruses, respiratory syncytial viruses, or adenoviruses.

• *Diagnosis of pertussis:-*

1-Clinical features: cough > 14 days, with at least 1 associated symptom of paroxysms, whoop, or post tussive vomiting has a sensitivity of 81% and a specificity of 58% for confirmation of pertussis.

2-Lab finding:

- Leukocytosis:15000-100000 cell/mm^3 ,with absolute lymphocytosis.
- Thrombocytosis.

- **3-CXR**:

✓ perihilar infiltrates or edema with butterfly appearance and variable atelectasis.

✓ Parenchymal consolidation suggests secondary bacterial infection.

✓ Pneumothorax, pneumo-mediastinum, and air in soft tissues can be seen .

- **4- Confirmation:-**

- PCR to test nasopharyngeal specimens has sensitivity similar to culture
- Culturing of **deep** nasopharyngeal aspiration.
- Serologic tests for detection of change in antibodies to B. pertussis antigens between acute and convalescent samples are the most sensitive tests in immunized individuals.

TREATMENT OF PERTUSSIS:

1-Non specific treatment:

- Hospital admission ***are indicated for:***
  - Infants younger than 3 mo of age with suspected pertussis .
  - 3 and 6 months of age with severe paroxysm.
  - Patients of any age if significant complications occur**.**
  - Prematurely born young infants
  - children with underlying cardiac, pulmonary, muscular, or neurologic disorders.
- Care of feeding, prevent dehydration.
- Removal from aggravating environmental smoke, excessive stimulation, or a dry or polluting heat source

• Infants who have apnea, paroxysms that lead to life-threatening events, or respiratory failure require escalating respiratory support and frequently require intubation and pharmaceutically induced paralysis.

2-Antimicrobial therapy: Although macrolide antibiotics eradicate the organism, they decrease symptoms only if started during the catarrhal phase. use either of:-

• ***Azithromycin****: :<6 months10 mg/kg single dose for5 days*
>6 months:10 mg/kg in a single dose on D 1, then 5 mg/kg/day on days 2-5

• ***Erythromycin:*** 40-50 mg/kg/day in 4 doses for 14 days**.**

• ***Clarithromycin*** 15 mg/kg day Bd PO for 7days.

• ***TMP-SMX***: for pt > 2m :TMP 8 mg/kg/day, SMX 40 mg/kg/day in 2 divided doses for 14 days

• **Adults:-Azithromycin**:500 mg in day1 then 250 mg/day on days 2-5 .
Clarithromycin 1 g/day in 2 divided doses for 7 days
Erythromycin: 2 g/day in 4 doses for 14 days.
TMP-SMX:TMP 320 mg/day, SMX 1600 mg/day in 2 divided doses for 14 day

PREVENTION OF PERTUSSIS:-

1 -pt isolation: pt should placed in respiratory isolation with use of masks by all health care personnel entering the room until 5days after initiation of azithromycin therapy .

2- Chemoprophylaxis for contacts:-
Azithromycin is the drug of choice in all age-groups, for treatment or post exposure prophylaxis should be given promptly to all household contacts and other close contacts, regardless of age, history of immunization, and symptoms.

3-Immunization: 3 doses of DTaP should be administered during the 1st year of life, at ages 2, 4, and 6 mo of age. In addition to 2 booster doses .

• Pregnant women should be given Tdap during every pregnancy between 27 and 36 wk of gestation to provide passive antibody protection to the infant until administration of DTaP. Safety of Tdap during pregnancy and effectiveness in reducing fatal pertussis in infants are proven.

• All adolescents and adults of any age (including ≥65 yr) who have not received Tdap should receive a single dose of Tdap promptly, regardless of interval since Td.

References:

• Nelson Textbook of Pediatrics , 21 edition .

• Nelson essentials Textbook of Pediatrics , 6th edition.

• Illustrated textbook of pediatrics.5th edition.